Remarks

This response is submitted within the shortened statutory period of three months to respond to the office action dated January 5, 2004. Therefore, a petition and fee for extension of time is filed with this response.

Please enter the following amendments and remarks into the prosecution history of the subject application without prejudice or disclaimer.

I. Claims

Hereinafter, the Claims that are pending prior to the entry of the amendments in this response are called "currently pending Claims". This response amends currently pending Claims 1, 9, 14, 15 and 17. Please cancel currently pending Claims 4 and 18-20 without prejudice or disclaimer. Please add new Claims 21-25. Upon amendment the above U.S. patent application will have 2 independent Claims (amended Claims 1 and 17) and a total of 21 Claims (currently amended 1, 9, 14, 15 and 17, currently pending Claims 2, 3, 5-8, 10-13 and 16 and new Claims 21-25). Applicants have previously paid for 20 total Claims and 3 independent Claims. Therefore, a check for excess Claims is filed with this response.

II. Claims Support

The Support for amended Claims 1, 9, 14, 15, 16 and 17and new Claims 21-25 can be found, inter alia, in the originally filed Specification and Claims as follows:

Claim 1: original Claims 1 and 4 and page 7, third paragraph.
Claim 9: original Claims 1 and 9.
Claim 14: original Claims 1 and 14.
Claim 15: original Claims 1 and 15.
Claim 17: original Claim 1, 4 and 17 and page 7, third paragraph.
Claim 21: page 7, third paragraph.
Claim 22: page 7, third paragraph.

Claim 23: page 3, fourth paragraph.

Claim 24: page 4, fifth paragraph.

Claim 25: original Claim 15 and page 8, second paragraph.

III. Claims Rejection under 35 U.S.C. 112, second paragraph

The Examiner rejects currently pending Claims 9-17 under 35 U.S.C. 112, second paragraph in item 2 on page 2 of the Office Action. Applicants submit the following amendments and arguments to overcome the rejection.

a) Re: Claim 9

Claim 9 was amended to read as follows: "A method ... before activating the substrate surface."

b) Re: Claim 10

Applicants submit that the term "fine-line circuitry" is very common in the field of metallisation of printed circuit boards. The term "fine" encompasses lines thinner than about 200 μm. Applicants traverse respectfully the Examiner's assertion that any size line will be considered to read into this language. Applicants have found U.S. Patents reciting the "fine-line circuitry" without a range, which is not necessary to describe it, since the range is very common in the scientific world. For example U.S. Patent No. 6,618,940 recites the term "fine line circuitry" in the process step c) of Claim 1 without any range. A copy of the Patent is enclosed.

c) Re: Claim 11

Applicants submit that the term "landless" refers to a via that is surrounded by a metal area, which is known as "land." In general, a metal pad or electrode is patterned on the surface of the substrate, thereafter a via is drilled through the metal pad and into the substrate. The metal of the pad that is left around the via is referred to as the "land." The invention as claimed in claim 11 allows to form

vias directly, without first having a metal pad. Since the claimed process does not involve a pad therefore "land" the term "landless" is admissible.

d) Re: Claim 14

Claim 14 was amended to read as follows: "A method ... comprising electrolessly plating non-planar features on the substrate surface."

e) Re: Claim 15

Claim 15 was amended to read as follows: "A method ... comprising selectively activating a region, adsorbing seeding particles on the region and electrolessly plating the region on the substrate surface between two circuit interconnects placed on the substrate surface..."

f) Re: Claim 17

Claim 17 has been rewritten in independent form including the Claim limitations of Claims 1, 4 and 17.

It is believed that the rejections under 35 U.S.C. 112, second paragraph are moot in view of the amendments and arguments presented in the preceding sections.

IV. Claims rejections under 35 U.S.C. § 102(b)

The Examiner rejects currently pending independent Claim 1 and currently pending depended Claim 17 in item 4 of the Office Action under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,011,567, hereinafter called "Gonsiorawski." Currently pending Claims 1 and 17 were amended by incorporating the limitation of currently pending Claim 4. The rejection under 35 U.S.C. 102(b) in view of Gonsiorawski is now moot.

V. Claims rejections under 35 U.S.C. § 103(a)

A

1. The Examiner rejects currently pending independent Claim 1 in item 5 of the Office Action under 35 U.S.C. § 103(a) as being allegedly obvious in view of U.S. Patent No. 4,877,644, hereinafter called "Wu", in view of U.S. Patent No. 5,035,918, hereinafter called "Vyas", in view of Gonsiorawski and in view of U.S. Patent No. 4,659,587, hereinafter called "Imura."

The Examiner does not reject currently pending Claim 4 under these grounds. Currently pending Claim 1 was amended by incorporating the limitation of currently pending Claim 4. Therefore, the rejection of Claim 1 is now moot.

2. The Examiner rejects currently pending independent Claim 1 in item 6 of the Office Action under 35 U.S.C. § 103(a) as being allegedly obvious in view of EP 260,514 B1, hereinafter called "Cole", further in view of EP 151,413 A2 hereinafter called "Inoue" and further in view of Vyas.

The Examiner does not reject currently pending Claim 4 under these grounds. Currently pending Claims 1 was amended by incorporating the limitation of currently pending Claim 4. Therefore, the rejection of Claim 1 is now moot.

3. The Examiner rejects currently pending dependent Claim 4 in item 10 of the Office Action under 35 U.S.C. § 103(a) as being allegedly obvious in view of Cole, further in view of Inoue and further in view of Vyas as set forth in regard to currently pending independent Claim 1 and further in view of U.S. Patent No. 5,487,852, hereinafter called "Ludden".

In summary the Examiner rejects the currently pending independent Claim 1 [old Claim 4] as being obvious over Cole, in view of Inoue, in view of Vyas and in view of Ludden.

The Examiner asserts that Cole teaches electroless plating with metals, inclusive of Cu, Pd, Ni, etc, on substrates (may be non-planar have metal pads, etc), that

may include polyimides, epoxies, silicone polyimides, polysulfones or silicone rubber, SiO_2, etc., or have a similar insulating surface layer, plus are coated with one or two removable layers, water and optional organic-soluble, either of which may be aromatic or non-aromatic. A laser is used to ablate a pattern in the soluble polymeric layer, or alternately through that layer and the insulating surface on the substrate. A catalytic coating capable of instigating electroless coating is applied, then the electroless plating solution is contacted to the substrate, selectively plating the exposed areas, while washing away the soluble layers. This process may be for embedded metal pads in the substrate surface and be used to provide interconnections between circuit patterns.

The Examiner acknowledges that the seed or catalyst layer according to Cole differs from old claim 1 by depositing over the entire surface, all materials, not just preferentially on the laser treated related areas.

The Examiner asserts further that Inoue discloses dielectric materials, such as acrylonitrite butadiene styrene, epoxy, silica, alumina, etc., that become activated when laser treated, where catalytic priming solution is applied thereto in preparation for electroless plating. The Examiner further asserts that Inoue is cumulative in demonstrating laser activation of substrate surface insulting materials, as employed by Cole such that selective deposition of the catalyst can be achieved.

The Examiner asserts that Vyas provides alternative ablatable and strippable resist layers, i.e. the styrene copolymer, which is consistent with Inoue's teaching in that it does not adhere the catalyst material unless activated, but is an effective material to be using in this procedure.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art to use a resist layer as suggested by Vyas in Cole in order to provide taught selective plating deposition, with strippable masks, because the Vyas resist material provides the advantage of minimizing use of expensive catalytic material (i.e. does not waste noble metal catalyst by depositing the resist), but

continues to provide the advantages of using the resist when complex substrates may be involved. Also, the Vyas resist is consistent with options taught by Cole et al in column 5, where polystyrenes are among the possible resist materials.

The Examiner asserts that in the above combination, the strippable polymer is a styrene acrylic co-polymer, hence while it includes an aromatic, it also "comprises" a non-aromatic polymer, i.e. the acrylic. The Examiner acknowledges that the insulating substrate materials used in Cole are generic categories, not indicating aromatic or not, however as taught some embodiments require laser ablation, hence use of a laser ablatable suggested dielectric, such as polyimides would have been required. The Examiner further asserts that Ludden provides examples of aromatic polymers containing polyimides. The Examiner concludes that the use of these polyimides in Cole would have been desirable to practice taught results.

Applicants respectfully traverse the Examiner's rejection and assert that amended Claims 1 and 17 are not obvious in view of the foregoing cited art for the following reasons set forth bellow.

B

1. Amended Claim 1 has the following Claim limitations:

A method of plating a substrate material ... comprising:

a) applying a strippable coating to a substrate surface to be plated, wherein the substrate is an aromatic polymer and the strippable coating is a non-aromatic polymer;
b) selectively illuminating the coated substrate surface with laser light to ablate a selected area of the strippable coating and to activate an underlying region of the substrate surface exposed by the ablation of the strippable coating;
c) contacting the activated region of the substrate surface with seeding particles for electroless plating, whereby the seeding particles adhere preferentially to the activated region of the substrate surface; and
d) electrolessly plating the activated region of the substrate surface, whereby the seeded area of the substrate surface is selectively plated.

Currently pending Claims 9, 14 and 15 and amended Claims 2, 3, 5-8, 10-13 and 16 and new Claims 23-25 depend directly or indirectly from Claim 1.

2. Amended independent Claim 17 has the following Claim limitations:

A method for re-mapping a wafer comprising
a) applying an aromatic polymer layer to the wafer to be re-mapped;
b) covering the aromatic polymer layer with a strippable coating, which is a non-aromatic polymer;
c) selectively illuminating the coated aromatic polymer layer surface with laser light to ablate a selected area of the strippable coating and to activate an underlying region of the aromatic polymer layer surface exposed by the ablation of the strippable coating;
d) contacting the activated region of the aromatic polymer layer surface with seeding particles for electroless plating; and
e) electrolessly plating the activated region of the aromatic polymer surface, whereby the seeded area of the aromatic polymer substrate surface is selectively plated.

New Claims 21-22 depend directly or indirectly from Claim 17.

C

In rejecting currently pending independent Claim 1 [old Claim 4], under 35 U.S.C § 103 the Examiner bears the initial burden of presenting a *prima facie* case of obviousness.

Applicants respectfully submit that to establish a *prima facia* case of obviousness, three criteria must be met.

- First, there must be some suggestion or motivation either in the reference itself or in the knowledge generally available to one of ordinary skill in the art to modify the reference teaching.
- Second, there must be a reasonable expectation of success.
- Finally, the prior art references must teach or suggest all the Claim Limitations (MPEP 2142).

Further the teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art, therefore, in the combined reference teaching and not Applicants' disclosure.

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination (MPEP2143.01).

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure (MPEP 2143).

A *prima facie* case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art. An obviousness analysis requires that the prior art both suggest the claimed subject matter and reveal a reasonable expectation of success to one reasonably skilled in the art.

With this as a background, applicants analyzed the prior art Cole, Inoue, Vyas and Ludden patents applied by the Examiner in the rejection of currently pending independent Claim 1 [old Claim 4] in the Office Action. Applicants submit that amended Claim 1 and 17 are each non-obvious in view of Cole, in view of Inoue and Vyas and further in view of Ludden for the reasons set forth below.

1. Re: Cole

Cole teaches a process for electrolessly plating metal on a substrate by exposing at least a portion of the substrate to laser radiation and to products produced thereby. The object as thought by Cole is to provide a photoselective metal deposition process in which fine lines can be plated on a substrate, even on raised and/or rounded surfaces. See Column 2, lines 6-9.

Applicants submit that Cole teaches the following process. See example 1.

> "A ... polyimide was spin coated on a quartz slide. The ... polyimide was cured. A solution of polyvinylpyrrolidone in methanol was ... coated on the surface of the polyimide layer and then dried. ... The sample was then exposed to a Lambda Physik excimer laser ... A series of small spots and a line were written into the water-soluble layer ... The spots were given from 1 to 10 pulses. The line was written by moving the sample manually and irradiating at a rate of 5 pulses per second. ... The sample was then dipped in a 1% by weight solution of bis benzonitrile palladium chloride in toluene ... The activated substrate was blown dry and then immersed in an electroless copper bath ... The sample was then removed from the bath and rinsed in water. The area of the sample, which had been exposed to the excimer laser coated a bright film of copper. The unirradiated regions did not have a metallized layer thereon because the water-soluble protective coating was washed off in the plating bath" (Emphasis added).

Applicants submit that a soluble layer of material is used to coat the substrate. Thereafter a laser is used to open a hole in the soluble layer. Thereafter, a catalyst is added on the entire substrate, therefore on the soluble layer as well. The substrate is then immersed in a plating solution that washes away the soluble layer and excess seeding solution attached to the soluble layer, while plating the areas of the underlying substrate.

Applicants submit that Cole teaches a different process than the process claimed in currently pending and amended Claim 1. Cole does not teach that the coating can be used to improve the selectivity of the seeding. Applicants submit that Cole teaches the seeding particles are applied on the entire coating.

The applicants submit that the process as taught by Cole teaches away form the claimed invention for the following reasons.

a) Cole teaches that the seeding layer covers the entire substrate, including the soluble coating layer.

b) Cole further teaches that the soluble layer and the seeding material attached to it are washed off into the plating solution.

The person skilled in the pertinent art would have no reason to consider modifying the teaching of Cole. Cole certainly does not teach to modify the teaching of Cole and to make the invention as claimed in amended independent Claims 1 and 17.

Taking the teaching of Cole, the Examiner's assertion that the currently pending independent Claim 1 and dependent Claim 4 are obvious in view of Cole and in view of any other prior art has no merit.

2. *Re: Inoue*

Inoue teaches an auto-selective metal deposition on dielectric surfaces. Inoue teaches the following process. See pages 6 to 9 and Fig. 1(A) to Fig. 1 (D).

> "A laser spot moves on a surface of a dielectric substrate, leaving behind a sharply delineated beam-treated area. The dielectric substrate may, for example, be a composite plate, which comprises a glass-fiber woven textile having layers of an epoxy resin coated thereon at both sides. During the beam treatment operation, each site of the dielectric surface irradiated with the focused beam is highly activated.
> When the entire preselected areas have been so treated, the treated substrate is introduced into and immersed in the bath of a priming solution. The substrate in contact with the priming solution then becomes catalytic, and develops precipitation nuclei, selectively at the activated sites. The priming solution may be a solution of palladium chloride.
> After removal from the bath, the substrate is washed with chloric acid and then water-rinsed.
> After drying, the substrate is introduced into and immersed in a bath of an electroless plating solution. This will cause metal (e.g. copper or nickel) from the electroless plating solution to auto-reductively or -catalytically deposit selectively at activated, preselected areas of the dielectric surface of the substrate."

Applicants respectfully submit that Inoue does not teach or suggest applying any kind of strippable coating to a substrate to be plated. Inoue teaches applying the priming solution on the whole substrate, which causes a waste of the primer solution. Inoue does not teach or suggest to modify the teaching of Inoue and to arrive at the invention as claimed in amended Claims 1 and 17. Cole and Inoue

combined do not teach or suggest all the Claim limitations of amended Claims 1 and 17. Further, there is no suggestion or motivation in the references itself to modify and to combine the reference teaching and to apply a strippable coating to a substrate surface to be plated. Based on the combined teaching of Cole and Inoue it is not in the knowledge generally available to one of ordinary skill in the art to modify the teaching and to make the invention as claimed in amended Claims 1 and 17. The combined teaching of Cole and Inoue does not suggest the claimed subject matter and does not reveal a reasonable expectation of success. Finally, neither Cole nor Inoue address any problem, which would be solved by applying a strippable coating to a substrate surface to be plated.

3. *Re: Vyas*

Vyas teaches a non-flammable and strippable plating resist and method of using it. See Column 4, lines 7-42.

> "The method comprises the steps of spraying or printing a thin uniform layer of a resist onto a metal substrate and drying it in situ. The resist is resistant to chemical plating solutions, is readily strippable in alkaline solutions, and has a flashpoint in excess of 100° F. A preferred formulation for such resist comprises styrene acrylic co-polymer. Thereafter, selected areas of said resist coated substrate are subjected to a controlled excimer laser pulse to remove the resist within said areas, following by plating the exposed areas of said substrate with a precious metal, and stripping said resist from the remaining portions of said metal substrate."

Applicants submit that Vyas teaches coating a metal substrate with a layer, which comprises styrene acrylic co-polymer prior being subjected to a controlled laser pulse. Styrene acrylic co-polymer is an aromatic polymer. Vyas does not teach or suggest applying a strippable coating to a substrate surface to be plated, wherein the substrate is an aromatic polymer and the strippable coating is a non-aromatic polymer. Vyas does not teach or suggest to modify the teaching and to arrive at the invention as claimed in amended Claims 1 and 17. Cole and Vyas combined do not teach or suggest all the Claim limitations of amended Claims 1

and 17. Further, there is no suggestion or motivation in the references itself to modify the reference teaching and to apply a strippable coating to a substrate surface to be plated, wherein the substrate is an aromatic polymer and the strippable coating is a non-aromatic polymer. The teaching of Vyas, namely to use a metal substrate and to coat the substrate with styrene acrylic co-polymer would automatically deter the person skilled in the art from considering Vyas by making the invention as claimed in amended claims 1 and 17.

Based on the combined teaching of Cole and Vyas it is not in the knowledge generally available to one of ordinary skill in the art to modify the teaching and to make the invention as claimed in amended Claims 1 and 17. The combined teaching of Cole and Vygas does not suggest the claimed subject matter and does not reveal a reasonable expectation of success. Finally, Cole does not address any problem, which would be solved by applying a strippable coating to a substrate surface to be plated. There would be therefore no reason to combine the reference teachings of Cole and Vyas in the first place.

The Examiner concludes that the use of these polyimides in Cole would have been desirable to practice taught results. This assertion has no merits based on applicant's analysis set forth in the preceding sections in regard to Cole and Vyas.

4. Re: Ludden

Ludden teaches laser-machining polymers. Ludden teaches a method according to Claim 1 as follows:

> "A method of making an article of polymeric material comprising laser-ablation-machining a body of polymeric material at a laser wavelength, power density, and energy fluence sufficient to remove portions of the body, the body comprising low to zero-charring material selected from the group consisting of:
> (a) polyamide material which is aromatic or amorphous or both;
> (b) polymer having in its polymer backbone aromatic rings and aliphatic chains, the polymer being selected from the group consisting of polyetheresters and polyimides; and

(c) polyester material other than polyetheresters having in its polymer backbone aromatic rings, ester carboxylate groups and aliphatic chains between the carboxylate groups, which chains having at least 4 carbon atoms. "

Applicants respectfully submit that Ludden teaches in a different technical field of technology. The technology of Ludden has nothing in common with a method of forming selective electroless plating on polymer surfaces. Applicants respectfully remind the Examiner about the three criteria for establishing a *prima facie* case of obviousness. Take the three criteria as a basis, combining the teaching of Ludden with Cole is inadmissible, in this case in order to establish a *prima facie* case of obviousness. The Examiner's conclusion that it would be desirable to use the polyimides as taught by Ludden in the process taught by Cole in order to make the invention as claimed by old claim 4 is, with all due respect, without merit.

A combination of the teachings of Cole, Inoue, Vyas and Ludden is based on a hindsight reconstruction of the Applicants' Claims as set forth above. Therefore, the only motivation or suggestion to combine the references is based upon the Applicants' own disclosure.

Applicants finally submit that in making the assessment of differences, 35 U.S.C § 103 specifically requires consideration of the claimed invention "as a whole." The "as a whole" instruction in title 35 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might break an invention into its component parts, then find a prior art reference containing one part, another containing another part, and on that basis alone declare the invention obvious. This form of hindsight reasoning, using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result – often the very definition of invention. In present case, the new invention is claimed in amended independent Claims 1 and 17.

35 U.S.C. § 103 precludes this hindsight discounting of the value of new combinations by requiring assessment of the invention as a whole. The

assurance of an "as a whole" assessment of the invention under 35 U.S.C. § 103 requires a showing that a person of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would select the various elements from the prior art and combine them in the claimed manner.

The examiner fails to show some suggestion or motivation, before the invention itself, to make the new combination. The examiner did not find a motivation to combine prior art references in the nature of the problem to be solved.

Applicants submit that a motivation to combine the teaching of Cole, Inoue, Vyas and Ludden clearly requires using hindsight in its obviousness analysis because the references address different problems to be solved and teach in a different technical field as set forth in regard to Ludden.

Applicants finally submit that since the independent Claims 1 and 17 are non-obvious under 35 U.S.C. § 103, then any Claim depending therefrom is non-obvious (MPEP 2143.03). Therefore, dependent Claims 2-3, 5-16 and 21-25 are non-obvious as well.

D

If the Examiner rejects currently amended Claims 1, 9, 14, 15 and 17, currently pending Claim 2, 3, 5-8, 10-13 and 16 and new Claims 21-25 on prior art grounds, the Applicants respectfully request that the Examiner show how the references teach or suggest every element of the rejected Claims.

Accordingly, reconsideration and examination of the present application is respectfully requested.

The application is now in condition for allowance. Allowance of the application at an early date is respectfully requested.

The Applicants reserve the right to seek protection for any unclaimed subject matter either subsequently in the prosecution of the present case or in a divisional or continuation application.

This response amends currently pending Claims 1, 9, 14, 15 and 17 cancels currently pending Claims 4 and 18-20 and adds new Claims 21-25. The amendments, cancellations and additions that are described in the preceding sentence were done to more fully claim the invention and/or to improve the wording of the Claims and were not done to overcome rejections under 35 U.S.C. 112, to overcome the prior art or to overcome any other rejections or objections. The amendments that are described in the first sentence of this paragraph shall not be considered necessary to overcome the prior art, shall not be considered necessary to overcome rejections under 35 U.S.C. § 112, and shall not be considered necessary to overcome any other rejections or objections.

The Commissioner is authorized to charge any additional fees, which may be required or credit overpayment to deposit account no. 12-0415. In particular, if this response is not timely filed, then the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136 (a) requesting an extension of time of the number of months necessary to make this response timely filed. The petition fee due in connection therewith may be charged to deposit account no. 12-0415.

I hereby certify that this correspondence is being deposited with the United States Post Office with sufficient postage as first class mail in an envelope addressed to Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450 on

May 5, 2004
(Date of Deposit)
Corinda Humphrey
(Name of Person Signing)
Corinda Humphrey
(Signature)
May 5, 2004
(Date)

Enclosures: Request for Extension of time
Check for one month Extension
Check for one excess Claim
U.S. Patent No. 6,618,940

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